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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/774,399
Filing Date: February 10, 2004
Appellant(s): LAGRANGE ET AL.

Chris Comuntzis
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed August 11, 2010 appealing from the Office action mailed October 16, 2007.

(1) Real Party in Interest

The examiner has no comment on the statement, or lack of statement, identifying by name the real party in interest in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal. Appellant mentions application 10/774,400 as involving similar subject matter to the instant application. An Examiner's Answer was written in Application 10/774,400, and in response to a new ground of rejection in the Examiner's Answer, Appellant elected to re-open prosecution. Application 10/774,400 ultimately was allowed based on the re-opened prosecution and amendments to the claims, and did not advance to the point where the Board of Patent Appeals and Interferences rendered a decision therein.

(3) Status of Claims

The following is a list of claims that are rejected and pending in the application:

10, 12-20, 29-45, 48-49, 52-53, 55-56, and 59-60.

(4) Status of Amendments After Final

The examiner has no comment on the appellant's statement of the status of amendments after final rejection contained in the brief.

(6) Grounds of Rejection to be Reviewed on Appeal

The examiner has no comment on the appellant's statement of the grounds of rejection to be reviewed on appeal. Every ground of rejection set forth in the Office action from which the appeal is taken (as modified by any advisory actions) is being maintained by the examiner except for the grounds of rejection (if any) listed under the subheading "WITHDRAWN REJECTIONS." New grounds of rejection (if any) are provided under the subheading "NEW GROUNDS OF REJECTION."

NEW GROUND(S) OF REJECTION

Claim 10, 12-20, and 29-40 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claims 10 and 29 were amended in the amendments of February 26, 2007 and August 14, 2007. Claims 10 and 29 now recite that "wherein the straight surfaces of each of the two uppermost tangs on either side of a center line bisecting each of said buckets define two points of a line that form an angle of 25.78° with the center line" (claim 10, lines 11-13 and claim 29, lines 4-6; see the Claims Appendix of the Appeal Brief). However, the original specification at paragraph [0047], lines 3-7 states "In FIGURE 10 angles D and E are measured from center line C to lines defined by points at which tangent lines along the first and second fillets intersect. Angles D and E are respectively 18.000° and 20.780°." The amended claim language is broader

than the original disclosure, since it does not limit the definition of the two points to the location at which the straight surfaces intersect, which is what the specification and figure 10 disclose. Therefore, the amended claim language is broader than the originally filed disclosure, i.e. figure 10.

WITHDRAWN REJECTIONS

Appellant's argument on page 21, the last paragraph of Appellant's Appeal Brief, arguing that the term "fillets" in claim 12 is definite, has been carefully considered and is persuasive. Therefore, the rejection of claim 12 under 35 USC 112, second paragraph related to the term "fillets" is withdrawn.

(7) Claims Appendix

The examiner has no comment on the copy of the appealed claims contained in the Appendix to the appellant's brief.

(8) Evidence Relied Upon

5,176,500	HEINIG	1-1993
5,147,180	JOHNSON	9-1992
677,142	UNITED KINGDOM	8-1952
6,030,178	CARUSO	2-2000
4,191,509	LEONARDI	3-1980
4,824,328	PISZ ET AL.	4-1989

Applicant's Prior Art (specification, paragraph [0002])

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 10, 12-20, and 29-40 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 10, lines 12-13 recite the straight surfaces of each of the two uppermost tangs on either side of a center line bisecting each of the buckets define two points of a line that form an angle of 25.78 degrees with the center line. This is inaccurate and should be amended to state that the straight surfaces of each of the two uppermost tangs on either side of a center line bisecting each of the buckets each respectively define a point of a line that forms an angle of 25.78 degrees with the center line, since each tang defines the point of the line. In claim 29, line 4, 'the straight surfaces" lacks antecedent basis. Claim 29, lines 4-5 recite the straight surfaces of each of the two uppermost tangs on either side of a center line bisecting each of the buckets define two points of a line that form an angle of 25.78 degrees with the center line. This is inaccurate and should be amended to state that the straight surfaces of each of two uppermost tangs on either side of a center line bisecting each of the buckets each respectively define a point of a line that forms an angle of 25.78 degrees with the center line, since each tang defines the point of the line. In claim 29, line 5, "said buckets" lacks antecedent basis.

Claim 29, as far as it is definite and understood, is rejected under 35 U.S.C. 102(b) as being anticipated by Heinig 5,176,500. Disclosed is a bucket 9 for insertion into an unnumbered

wheelpost of a turbine rotor 18, the bucket formed from interleaved fillets and tangs which complement interleaved fillets and tangs formed in the wheelpost, wherein straight surfaces of each of the two uppermost tangs on either side of a center line bisecting each of the buckets each respectively define a point of a line that forms an angle of 25.78° with the center line, each of the points being determined by intersecting tangent lines along pressure faces of the respective uppermost tangs, wherein a point defined by intersecting tangent lines along the pressure faces of the bottommost tang does not lie on either line that forms the angle of 25.78° with the center line. Note that a line drawn from the intersection of the angle formed by the straight surfaces of each of the two uppermost tangs on each side of a center line bisecting each of the buckets may be selectively drawn such that it intersects the center line and forms the aforementioned 25.78 degree angle, with the lines defined by the uppermost tangs not coinciding with a point formed by the bottommost tang, such that this angle is the same as Applicant's angle E of 25.78 degrees in figure 10, since the location where the drawn line that forms the angle E intersects the center line is an arbitrary location.

Claims 10 and 13-19, as far as they are definite and understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson 5,147,180 in view of Applicant's Prior Art. Johnson discloses a turbine substantially as claimed, having multiple stages, with a wheel 20 having unnumbered wheelposts, each having an interleaved system of fillets and tangs, and a plurality of buckets 10 each having a corresponding interleaved system of fillets and tangs 22, 24, 26, 28, 30, 32 so that the plurality of buckets can be fitted, one to one, into the wheelposts on the wheel, the interleaved system of fillets and tangs on the buckets and wheelposts act to reduce stresses acting on the fitted buckets and wheelposts, the fillets and tangs of the interleaved system of fillets and tangs each being formed by a combination of curved and straight surfaces, straight surfaces 28a, 28b of each of two uppermost tangs on either side of a

center line bisecting each of the buckets each respectively define a point of a line that forms an angle of about 24 degrees with the center line, and a point defined by intersecting tangent lines along the pressure faces of the bottommost tang does not lie on either line that forms the angle of 24 degrees with the center line. There are three interleaved fillets and tangs on the buckets and wheelposts. The bottom tang 32 is formed from curved surfaces having more than one radius of curvature. Each bucket further includes straight surfaces 30a, 30b. Each of the wheelposts has a corresponding bottom fillet formed from curved surfaces having more than one radius of curvature. Each of the wheelposts has corresponding straight surfaces.

However, Johnson does not disclose that the third stage has the above fillet and tang configurations (claim 10), does not disclose ninety wheelposts that receive ninety buckets (claim 10), does not disclose that the straight surfaces of each of two uppermost tangs on either side of a center line bisecting each of the buckets each respectively define a point of a line that forms an angle of 25.78 degrees with the center line (claim 10), does not disclose that the bottom tang curved surfaces have radii of curvatures of .1992 inches and .3360 inches (claim 18), and does not disclose that the wheelpost bottom fillet curved surfaces have radii of curvatures of .2052 inches and .3420 inches (claim 19).

Applicant's Prior Art (paragraph two) states that as many as 92 buckets are present in a turbine, which one of ordinary skill in the art would consider as a reasonable number. Using this guideline, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to form the turbine of Johnson with a specific number of wheelposts that receive a specific number of buckets, such as ninety, for the purpose of adjusting the output of the turbine for differing applications. The recitation of the turbine being directed to the third stage is a matter of choice in design. One of ordinary skill in the art would have recognized that

the arrangement disclosed by Johnson would also be applicable to a third stage turbine wheel, for the purpose of providing a turbine of acceptable efficiency with acceptable loads on a third stage wheel.

The recitation of the straight surfaces of each of two uppermost tangs on either side of a center line bisecting each of the buckets each respectively defining a point of a line that forms an angle of 25.78 degrees with the center line is a matter of choice in design. This particular angular arrangement is known in the art to be a result effective variable, which influences the stress in blade roots and the grooves. It would have been further obvious at the time the invention was made to a person having ordinary skill in the art to select the above angle to be a specific value, such as 25.78 degrees, for the purpose of reducing the stresses in the blade roots and the grooves, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

The recitation of the curved surfaces of the bucket bottom tang having radii of curvatures of .1992 inches and .3360 inches, and the recitation of the wheelpost bottom fillet having radii of curvatures of .2052 inches and 0.3420 inches are deemed to be matters of choice in design. The radii of curvature of curved surfaces of the bucket bottom tang and of the wheelpost bottom fillet are recognized by Johnson to be result-effective variables which, when optimized, reduce the stresses in the blade roots and the grooves. It would have been further obvious at the time the invention was made to a person having ordinary skill in the art to select the radii of curvature of the curved surfaces of the bucket bottom tang and of the wheelpost bottom fillet to be specific values, such as .1992 inches and .3360 inches for the bucket bottom tang, and such as .2052 inches and 0.3420 inches for the wheelpost bottom fillet, for the purpose of reducing the stresses

in the blade roots and the grooves, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Claim 12, as far as it is definite and understood, is rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson 5,147,180 and Applicant's Prior Art as applied to claim 10 above, and further in view of United Kingdom Patent 677,142. The modified turbine of Johnson shows all of the claimed subject matter except for the bucket tangs having angles ranging from 50 to 59 degrees.

United Kingdom Patent 677,142 shows a turbine having buckets (not shown), each bucket having tangs 4 having an angle of 55 degrees, which are attached to an unnumbered rotor, for the purpose of providing more favorable stress conditions in the turbine buckets and rotor.

It would have been further obvious at the time the invention was made to a person having ordinary skill in the art to form the modified turbine of Johnson such that the bucket tangs have angles ranging from 50 to 59 degrees, as taught by United Kingdom Patent 677,142, for the purpose of providing more favorable stress conditions in the turbine buckets and rotor.

Claim 20, as far as it is definite and understood, is rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson 5,147,180 and Applicant's Prior Art as applied to claim 10 above, and further in view of Caruso 6,030,178. The modified turbine of Johnson shows a turbine substantially as claimed as set forth above, including unnumbered wheelposts, but does

not show that the outer tang edge of each wheelpost is scalloped so as to reduce the weight of the turbine wheel.

Caruso (figure 1) shows a turbine wheel 10 having wheelposts shown generally at 12, which are formed such that an unnumbered outer tang edge of each wheelpost is scalloped, for the inherent purpose of reducing weight of the turbine wheel.

It would have been further obvious at the time the invention was made to a person having ordinary skill in the art to form the modified turbine of Johnson such that the outer tang edge of each wheelpost is scalloped, as taught by Caruso, for the purpose of reducing weight of the turbine wheel.

Claims 10, 16-17, and 19, as far as they are definite and understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Heinig 5,176,500 in view of Applicant's Prior Art. Heinig discloses a turbine substantially as claimed, with a wheel 18 having unnumbered wheelposts, each having an interleaved system of fillets and tangs, and a plurality of buckets 9 each having a corresponding interleaved system of fillets and tangs so that the plurality of buckets can be fitted, one to one, into the wheelposts on the wheel, the interleaved system of fillets and tangs on the buckets and wheelposts act to reduce stresses acting on the fitted buckets and wheelposts, the fillets and tangs of the interleaved system of fillets and tangs each being formed by a combination of curved and straight surfaces, straight surfaces of each of two uppermost tangs on either side of a center line bisecting each of the buckets each respectively define a point of a line that forms an angle of 25.78 degrees with the center line, and a point defined by intersecting tangent lines along the pressure faces of the bottommost tang does not lie on either line that forms the angle of 25.78 degrees with the center line. Each of the

wheelposts has a bottom fillet formed from curved surfaces having more than one radius of curvature. Each of the wheelposts has straight surfaces. Note that a line drawn from the intersection of the angle formed by the straight surfaces of each of the two uppermost tangs on each side of a center line bisecting each of the buckets may be selectively drawn such that it intersects the center line and forms the aforementioned 25.78 degree angle, with the lines defined by the uppermost tangs not coinciding with a point formed by the bottommost tang, such that this angle is the same as Applicant's angle E of 25.78 degrees in figure 10, since the location where the drawn line that forms the angle E intersects the center line is an arbitrary location.

However, Heinig does not disclose that the turbine has multiple stages (claim 10), does not disclose that that the third stage has the above fillet and tang configurations (claim 10), does not disclose ninety wheelposts that receive ninety buckets (claim 10), and does not disclose that the wheelpost bottom fillet curved surfaces have radii of curvatures of .2052 inches and .3420 inches (claim 19).

Applicant's Prior Art (paragraph two) states that as many as 92 buckets are present in a multiple stage turbine, which one of ordinary skill in the art would consider as a reasonable number. Using this guideline, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to form the turbine of Heinig with a specific number of wheelposts that receive a specific number of buckets, such as ninety, in a multiple stage turbine, for the purpose of adjusting the output of the turbine for differing applications. The recitation of the turbine being directed to the third stage is a matter of choice in design. One of ordinary skill in the art would have recognized that the arrangement disclosed by Heinig would also be

applicable to a third stage turbine wheel, for the purpose of providing a turbine of acceptable efficiency with acceptable loads on a third stage wheel.

The recitation of the wheelpost bottom fillet having radii of curvatures of .2052 inches and 0.3420 inches is deemed to be a matter of choice in design. The radii of curvature of the wheelpost bottom fillet are recognized by Heinig to be result-effective variables which, when optimized, reduce the stresses in the blade roots and the grooves. It would have been further obvious at the time the invention was made to a person having ordinary skill in the art to select the radii of curvature of the wheelpost bottom fillet to be specific values, such as .2052 inches and 0.3420 inches for the wheelpost bottom fillet, for the purpose of reducing the stresses in the blade roots and the grooves, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Claim 20, as far as it is definite and understood, is also rejected under 35 U.S.C. 103(a) as being unpatentable over Heinig 5,176,500 and Applicant's Prior Art as applied to claim 10 above, and further in view of Caruso 6,030,178. The modified turbine of Heinig shows a turbine substantially as claimed as set forth above, including unnumbered wheelposts, but does not show that the outer tang edge of each wheelpost is scalloped so as to reduce the weight of the turbine wheel.

Caruso (figure 1) shows a turbine wheel 10 having wheelposts shown generally at 12, which are formed such that an unnumbered outer tang edge of each wheelpost is scalloped, for the inherent purpose of reducing weight of the turbine wheel.

It would have been further obvious at the time the invention was made to a person having ordinary skill in the art to form the modified turbine of Heinig such that the outer tang edge of each wheelpost is scalloped, as taught by Caruso, for the purpose of reducing weight of the turbine wheel.

Claims 29-33, as far as they are definite and understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson 5,147,180. Johnson discloses a bucket 10 for insertion into an unnumbered wheelpost of a turbine rotor 20, the bucket formed from interleaved fillets and tangs 22, 24, 26, 28, 30, 32 which complement interleaved fillets and tangs formed in the wheelpost, wherein straight surfaces 28a, 28b of each of the two uppermost tangs on either side of a center line bisecting each of the buckets each respectively define a point of a line that forms an angle of about 24 degrees with the center line, each of the points being determined by intersecting tangent lines along pressure faces of the respective uppermost tangs, wherein a point defined by intersecting tangent lines along the pressure faces of the bottommost tang does not lie on either line that forms the angle of 24 degrees with the center line. The bucket has three interleaved tangs and fillets. The bucket has a bottom tang 32 formed from curved surfaces having more than one radii of curvature. The bucket has additional straight surfaces 30a, 30b.

However, Johnson does not disclose that the straight surfaces of each of two uppermost tangs on either side of a center line bisecting each of the buckets each respectively define a point of a line that forms an angle of 25.78 degrees with the center line (claim 29), and does not disclose that the bottom tang curved surfaces have radii of curvatures of .1992 inches and .3360 inches (claim 33).

The recitation of the straight surfaces of each of two uppermost tangs on either side of a center line bisecting each of the buckets each respectively defining a point of a line that forms an angle of 25.78 degrees with the center line is a matter of choice in design. This particular angular arrangement is known in the art to be a result effective variable, which influences the stress in blade roots and the grooves. It would have been obvious at the time the invention was made to a person having ordinary skill in the art to select the above angle to be a specific value, such as 25.78 degrees, for the purpose of reducing the stresses in the blade roots and the grooves, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

The recitation of the curved surfaces of the bucket bottom tang having radii of curvatures of .1992 inches and .3360 inches, is deemed to be a matter of choice in design. The radii of curvature of curved surfaces of the bucket bottom tang are recognized by Johnson to be result-effective variables which, when optimized, reduce the stresses in the blade roots and the grooves. It would have been further obvious at the time the invention was made to a person having ordinary skill in the art to select the radii of curvature of the curved surfaces of the bucket bottom tang to be specific values, such as .1992 inches and .3360 inches, for the purpose of reducing the stresses in the blade roots and the grooves, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Claims 34, 35, 36, 37, 38, 39, and 40, as far as they are definite and understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson 5,147,180 as applied to claims 30, 31, 30, 30, 31, 31, and 30, respectively above, and further in view of Leonardi 4,191,509. The modified bucket of Johnson shows all of the claimed subject matter, including

the bucket further including additional straight surfaces 30a, 30b, 32a, but does not show the upper tang 28 formed from curved surfaces with more than one radii of curvature (claims 34-35), and does not show the intermediate tang 30 formed from curved surfaces with more than one radii of curvature (claims 37-39).

Leonardi (figures 1-2 and 4) shows a bucket 18 having a root 16 with an upper tang 28 formed from curved surfaces with more than one radii of curvature R1, R2, and an intermediate tang 28 having more than one radius of curvature R1, R2, for the purpose of improving low cycle fatigue, and reducing combined bending and shear stress.

It would have been further obvious at the time the invention was made to a person having ordinary skill in the art to form the modified bucket of Johnson such that the upper tang is formed from curved surfaces with more than one radii of curvature, and intermediate tang is formed from curved surfaces with more than one radii of curvature, as taught by Leonardi, for the purpose of improving low cycle fatigue, and reducing combined bending and shear stress.

Claims 41-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pisz 4,824,328 in view of Applicant's Prior Art. Pisz (figures 1-6 and Table 7) discloses a turbine substantially as claimed, comprising a wheel 21 having wheelposts 110, each having an interleaved system of fillets and tangs, and a plurality of buckets 15 each having a corresponding interleaved system of fillets and tangs so that the plurality of buckets can be fitted, one to one, into the wheelposts on the wheel, wherein the interleaved system of fillets and tangs on the buckets and wheelposts act to reduce stresses acting on the fitted buckets and wheelposts, the fillets and tangs of the interleaved system of fillets and tangs each being formed by a combination of curved and straight surfaces, wherein above the uppermost tang on each of the

buckets there is a compound fillet having a first radius of curvature R1 of 0.3128 inches and a second radius of curvature R2 having 0.0873 inches. Below the upper most tang on each of the buckets there is a fillet having a radius of curvature R5 of 0.0477 inches. Above the bottom most tang on each of the buckets there is a fillet having a radius of curvature R10 of 0.0477 inches.

However, Pisz does not disclose that the turbine has multiple stages (claim 41), does not disclose that that the third stage has the above fillet and tang configurations (claim 41), does not disclose ninety wheelposts that receive ninety buckets (claim 41), does not disclose that above the uppermost tang on each of the buckets the compound fillet has a first radius of curvature of 0.3376 inches and a second radius curvature of 0.0718 inches (claim 41), does not disclose that below the upper most tang on each of the buckets the fillet has a radius of curvature of 0.0656 inches (claim 42), and does not disclose that above the bottom most tang on each of the buckets the fillet has a radius of curvature of 0.0695 inches (claim 43).

Applicant's Prior Art (paragraph two) states that as many as 92 buckets are present in a multiple stage turbine, which one of ordinary skill in the art would consider as a reasonable number. Using this guideline, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to form the turbine of Pisz with a specific number of wheelposts that receive a specific number of buckets, such as ninety, in a multi stage turbine, for the purpose of adjusting the output of the turbine for differing applications. The recitation of the turbine being directed to the third stage is a matter of choice in design. One of ordinary skill in the art would have recognized that the arrangement disclosed by Pisz would also be applicable to a third stage turbine wheel, for the purpose of providing a turbine of acceptable efficiency with acceptable loads on a third stage wheel.

The recitation of the uppermost tang on each of the buckets the compound fillet having a first radius of curvature of 0.3376 inches and a second radius curvature of 0.0718 inches, the recitation that below the upper most tang on each of the buckets the fillet has a radius of curvature of 0.0656 inches, and the recitation that above the bottom most tang on each of the buckets the fillet has a radius of curvature of 0.0695 inches, are deemed to be matters of choice in design. The radii of curvature of the bucket tangs are recognized by Pisz to be result-effective variables which, when optimized, reduce the stresses in the blade roots and the grooves. It would have been further obvious at the time the invention was made to a person having ordinary skill in the art to select the radii of curvature of the bucket tangs to be specific values, such as the uppermost tang on each of the buckets having the compound fillet with a first radius of curvature of 0.3376 inches and a second radius curvature of 0.0718 inches, such as below the upper most tang on each of the buckets the fillet having a radius of curvature of 0.0656 inches, and such as above the bottom most tang on each of the buckets the fillet having a radius of curvature of 0.0695 inches, for the purpose of reducing the stresses in the blade roots and the grooves, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Claims 44-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heinig 5,176,500 in view of Applicant's Prior Art. Heinig discloses a turbine substantially as claimed, comprising a wheel 18 having unnumbered wheelposts, each having an interleaved system of fillets and tangs, and a plurality of buckets 9 each having a corresponding interleaved system of fillets and tangs so that the plurality of buckets can be fitted, one to one, into the wheelposts on the wheel, wherein the interleaved system of fillets and tangs on the buckets and wheelposts act to reduce stresses acting on the fitted buckets and wheelposts, the fillets and tangs of the interleaved system of fillets and tangs each being formed by a combination of curved and

straight surfaces, wherein for each one of the plurality of buckets the distance from the bottom of the bottom most tang to the upper most straight portion of the upper most fillet is 0.9480 inches (figure 4). For each one of the plurality of buckets, the distance from the bottom of the bottom most tang to a first intersection point of tangent lines drawn along pressure faces of the tang adjacent to the bottom most tang appears to be greater than 60 percent of the distance 0.9480 inches.

However, Heinig does not disclose that the turbine has multiple stages (claim 44), does not disclose that that the third stage has the above fillet and tang configurations (claim 44), does not disclose ninety wheelposts that receive ninety buckets (claim 44), does not disclose that for each one of the plurality of buckets the distance from the bottom of the bottom most tang to the upper most straight portion of the upper most fillet is 1.4530 inches (claim 44), and does not disclose that for each one of the plurality of buckets the distance from the bottom of the bottom most tang to a first intersection point of tangent lines drawn along pressure faces of the tang adjacent to the bottom most tang is 0.5249 inches (claim 45).

Applicant's Prior Art (paragraph two) states that as many as 92 buckets are present in a multiple stage turbine, which one of ordinary skill in the art would consider as a reasonable number. Using this guideline, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to form the turbine of Heinig with a specific number of wheelposts that receive a specific number of buckets, such as ninety, in a multiple stage turbine, for the purpose of adjusting the output of the turbine for differing applications. The recitation of the turbine being directed to the third stage is a matter of choice in design. One of ordinary skill in the art would have recognized that the arrangement disclosed by Heinig would also be

applicable to a third stage turbine wheel, for the purpose of providing a turbine of acceptable efficiency with acceptable loads on a third stage wheel.

The recitation of the distance from the bottom of the bottom most tang to the upper most straight portion of the upper most fillet being 1.4530 inches, and the recitation of the distance from the bottom of the bottom most tang to a first intersection point of tangent lines drawn along pressure faces of the tang adjacent to the bottom most tang is 0.5249 inches are matters of choice design. These dimensions are recognized by Heinig to be result-effective variables which when optimized, reduce the stresses in the blade roots and the grooves. It would have been further obvious at the time the invention was made to a person having ordinary skill in the art to select the distance from the bottom of the bottom most tang to the upper most straight portion of the upper most fillet to be a specific value, such as 1.4530 inches, and to select the distance from the bottom of the bottom most tang to a first intersection point of tangent lines drawn along pressure faces of the tang adjacent to the bottom most tang to be 0.5249 inches, for the purpose of reduce the stresses in the blade roots and the grooves, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Claims 48 and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heinig 5,176,500 and Applicant's Prior Art as applied to claims 44 and 45, respectively above, and further in view of Phipps 6,893,226. The modified turbine of Heinig shows all of the claimed subject matter except for the angle between the upper most straight portion of the upper most fillet and the upper most straight portion of the upper most tang being 50 degrees.

Phipps shows a turbine blade 30 having an angle between an upper most straight portion of an upper most fillet 52 and an upper most straight portion of an upper most tang being 55 degrees, for the purpose of allowing the blade to withstand centrifugal loading when in operation.

It would have been further obvious at the time the invention was made to a person having ordinary skill in the art to form the modified turbine of Heinig such that the angle between the upper most straight portion of the upper most fillet and the upper most straight portion of the upper most tang is 55 degrees. The specific recitation of this angle being 50 degrees is a matter of choice in design. This angle is known to be a result-effective variable which adjusts the stress distribution in the blade roots. It would have been further obvious at the time the invention was made to a person having ordinary skill in the art to form the modified turbine of Heinig such that this specific angle is 50 degrees, for the purpose of optimizing the stress distribution in the blade roots, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Claims 52-53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson 5,147,180 in view of Applicant's Prior Art. Johnson discloses a multiple stage turbine substantially as claimed, comprising a wheel 20 having unnumbered wheelposts, each having an interleaved system of fillets and tangs, and a plurality of buckets 10 each having a corresponding interleaved system of fillets and tangs so that the plurality of buckets can be fitted, one to one, into the wheelposts on the wheel, wherein the interleaved system of fillets and tangs on the buckets and wheelposts act to reduce stresses acting on the fitted buckets and wheelposts, the fillets and tangs of the interleaved system of fillets and tangs each being formed by a combination of curved and straight surfaces, wherein below the uppermost tang on each of the wheelposts there is fillet (corresponding to R3, R4) having a radius of curvature of about 0.0721

inches, and above a bottom most tang on each of the wheelposts there is a fillet (corresponding to R7, R8) of about 0.0737 inches.

However, Johnson does not disclose that the turbine has multiple stages (claim 52), does not disclose that that the third stage has the above fillet and tang configurations (claim 52), does not disclose ninety wheelposts that receive ninety buckets (claim 52), does not disclose that below the uppermost tang on each of the wheelposts the fillet has a radius of curvature of 0.0855 inches (claim 52), and does not disclose that above the bottom most tang on each of the wheelposts the fillet has a radius of curvature of 0.0752 inches (claim 53).

Applicant's Prior Art (paragraph two) states that as many as 92 buckets are present in a multiple stage turbine, which one of ordinary skill in the art would consider as a reasonable number. Using this guideline, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to form the turbine of Johnson with a specific number of wheelposts that receive a specific number of buckets, such as ninety, in a multi stage turbine, for the purpose of adjusting the output of the turbine for differing applications. The recitation of the turbine being directed to the third stage is a matter of choice in design. One of ordinary skill in the art would have recognized that the arrangement disclosed by Johnson would also be applicable to a third stage turbine wheel, for the purpose of providing a turbine of acceptable efficiency with acceptable loads on a third stage wheel.

The recitation that below the uppermost tang on each of the wheelposts the fillet has a radius of curvature of 0.0855 inches, and that above the bottom most tang on each of the wheelposts the fillet has a radius of curvature of 0.0752 inches are matters of choice in design. Johnson recognizes that these are result-effective variables which, when optimized, reduce the

stresses in the blade roots and the grooves. It would have been further obvious at the time the invention was made to a person having ordinary skill in the art to select the radius of curvature of the uppermost tang on each of the wheelposts of the fillet to have a specific radius of curvature, such as 0.0855 inches, and to select the radius of curvature above the bottom most tang on each of the wheelposts of the fillet to have a specific radius of curvature, such as of 0.0752 inches, for the purpose of reducing the stresses in the blade roots and the grooves, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Claims 55-56 and 59-60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heinig 5,176,500 in view of Applicant's Prior Art. Heinig discloses a turbine substantially as claimed, comprising a wheel 18 having unnumbered wheelposts, each having an interleaved system of fillets and tangs, and a plurality of buckets 9 each having a corresponding interleaved system of fillets and tangs so that the plurality of buckets can be fitted, one to one, into the wheelposts on the wheel, wherein the interleaved system of fillets and tangs on the buckets and wheelposts act to reduce stresses acting on the fitted buckets and wheelposts, the fillets and tangs of the interleaved system of fillets and tangs each being formed by a combination of curved and straight surfaces, wherein for each one of the wheelposts the distance from the bottom of the bottom most fillet to the upper most straight portion of the upper most tang is 0.9500 inches (figure 3). For each one of the plurality of wheelposts, the distance from the bottom of the bottom most fillet to a first intersection point of tangent lines drawn along pressure faces of the fillet adjacent to the bottom most fillet appears to be greater than 60 percent of the distance 0.9500 inches.

However, Heinig does not disclose that the turbine has multiple stages (claim 55), does not disclose that that the third stage has the above fillet and tang configurations (claim 55), does not disclose ninety wheelposts that receive ninety buckets (claim 55), does not disclose that for each one of the wheelposts the distance from the bottom of the bottom most fillet to the upper most straight portion of the upper most tang is 1.4530 inches (claim 55), does not disclose that for each one of the plurality of wheelposts, the distance from the bottom of the bottom most fillet to a first intersection point of tangent lines drawn along pressure faces of the fillet adjacent to the bottom most fillet is 0.5251 inches (claim 56), and does not disclose that for each one of the wheelposts the angle between the upper most straight portion of the upper most tang and the upper most straight portion of the upper most fillet is 50 degrees (claims 59 and 60).

Applicant's Prior Art (paragraph two) states that as many as 92 buckets are present in a multiple stage turbine, which one of ordinary skill in the art would consider as a reasonable number. Using this guideline, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to form the turbine of Heinig with a specific number of wheelposts that receive a specific number of buckets, such as ninety, in a multiple stage turbine, for the purpose of adjusting the output of the turbine for differing applications. The recitation of the turbine being directed to the third stage is a matter of choice in design. One of ordinary skill in the art would have recognized that the arrangement disclosed by Heinig would also be applicable to a third stage turbine wheel, for the purpose of providing a turbine of acceptable efficiency with acceptable loads on a third stage wheel.

The recitation of the distance from the bottom of the bottom most fillet to the upper most straight portion of the upper most tang being 1.4530 inches, the recitation of the distance from the bottom of the bottom most fillet to a first intersection point of tangent lines drawn along

pressure faces of the fillet adjacent to the bottom most fillet being 0.5251 inches, and the recitation of the angle between the upper most straight portion of the upper most tang and the upper most straight portion of the upper most fillet being 50 degrees are matters of choice design. These lengths and this angle are recognized by Heinig and in the art to be result-effective variables which when optimized, reduce the stresses in the blade roots and the grooves. It would have been further obvious at the time the invention was made to a person having ordinary skill in the art to select the distance from the bottom of the bottom most fillet to the upper most straight portion of the upper most tang to be a specific value, such as 1.4530 inches, to select the distance from the bottom of the bottom most fillet to a first intersection point of tangent lines drawn along pressure faces of the fillet adjacent to the bottom most fillet to be 0.5251 inches, and to select the angle between the upper most straight portion of the upper most tang and the upper most straight portion of the upper most fillet to be 50 degrees, for the purpose of reducing the stresses in the blade roots and the grooves, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

(10) Response to Argument

Concerning argument A, which is whether claims 10, 12-20, and 29-40 are properly rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which appellant regards as the invention, Appellant has argued that the examiner misinterprets claims 10 and 29 and implies that Appellant's requirement that "the straight surfaces of each of the two uppermost tangs on each side of a centerline bisecting each of the buckets" means that only the uppermost tang on each side of the bucket, for example tang 22 in Appellant's Figure 10, is utilized to "define a point of

a line that forms an angle of 25.78 degrees". Appellant has further argued that the examiner has misinterpreted the claim language that requires the use of two tangs on each side of the bucket to define the line that forms angle E with the center line, and that the examiner's interpretation of the claim is erroneous because a line cannot properly be defined by a single point, and that by doing so, leads to the result of allowing a line being drawn through the single determined point at any angle, including the angle required by the claims.

These arguments are respectfully disagreed with, because Appellant is attempting to import limitations from the specification which are not recited in the claims in order to rebut the indefiniteness rejection. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See In re Van Geuns, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Appellant's figure 10 of August 14, 2007 shows angle E which is formed by two points derived from tangs 22, 23 that are connected by a line intersecting the centerline C, but the claim language of claims 10 and 29 does not recite this. Claims 10 and 29 recite that "wherein the straight surfaces of each of the two uppermost tangs on each side of a center line bisecting each of said buckets define two points of a line that form an angle of 25.78° with the center line" (claim 10, lines 11-13 and claim 29, lines 4-6; see the Claims Appendix of the Appeal Brief). This amended claim language does not limit the definition of the two points to the location at which the straight surfaces intersect, which is what the specification and figure 10 disclose. As is literally written in Appellant's claims 10 and 29, the straight surfaces of each of the two uppermost tangs on each side of a center line bisecting each of the buckets define two points of a line that form an angle of 25.78 degrees with the

center line. This is broader than the specification embodiment argued by the appellant therefore the rejection has been maintained. It is noted that a 112, first paragraph rejection has been made to reflect the fact that the specification does not support the present claim language. It is also noted that on page 20 of the Appeal Brief, Appellant states that independent claims 10 and 29 recite "wherein the straight surfaces of each of the two uppermost tangs on each side of a center line bisecting each of said buckets define two points of a respective line that form an angle of 25.78° with the center line; and...". However, independent claims 10 and 29 do not contain the underlined limitation "of a respective line", as Appellant has argued.

Appellant's acquiescence with the regard to the rejection of claim 29 under 35 USC 112, second paragraph, because the term "straight surfaces" lacks antecedent basis, is noted by the examiner.

Concerning argument B, which is whether claims 29-32 are anticipated under U.S.C. 102(b) by Heinig 5,176,500, Appellant has argued that the examiner has erroneously used a single upper tang (one on each side of the bucket) to determine a single point used to define a line forming an angle of 25.78° with the center line of the bucket, and that if the two uppermost tangs of Heinig are used, as required by the claim language, to define the line, then the angle formed with the center line is approximately 15° in Heinig. Appellant has also argued that the line defined by the two uppermost tangs on each side of the bucket must necessarily lie along tangent lines to the pressure faces of the bottom most tang, since Heinig only has two tangs and the bottommost tang must be used to define the line forming an angle of 25.78° with the center

line of the bucket, the bottommost tang of Heinig must lie along the defined line in contravention of the claim language, and that Heinig does not meet the last limitation in claim 29 "wherein a point defined by intersecting tangent lines along the pressure faces of the bottommost tang does not lie on either line that forms the angle of 25.78° with the center line."

These arguments are respectfully disagreed with, because Heinig still discloses the claimed subject matter. The straight surfaces of each of the two uppermost tangs on each side of a center line bisecting each of the buckets each respectively define a point of a line that forms an angle of 25.78 degrees with the center line on both of these references. The line drawn from the intersection of the straight surfaces of each of the two upper most tangs may be selectively drawn such that it intersects the center line (at a portion of the center line remote from the blade root) and forms the aforementioned 25.78 degree angle, such that this angle is the same as Appellant's angle E of 25.78 degrees in figure 10, and a point defined by intersecting tangent lines along pressure faces of the bottom most tang does not lie on either line that forms the angle of 25.78 degrees with the center line, since the location where the drawn line that forms the angle E intersects the center line is an arbitrary location. Claim 29 does not limit the definition of the two points to the location at which the straight surfaces intersect, which is what the specification and figure 10 disclose. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See In re Van Geuns, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

With regard to Appellant's arguments that Heinig does not disclose a bucket having tangs formed from multiple straight surfaces, as required by claim 29, and that Heinig discloses that each of its two tangs are formed from curved surfaces having radii of R1 through R8 and a single flat bearing surface bl (for the uppermost tang) and b2 (for the bottommost tang) as shown in figure 1 and described at column 4, line 42 through column 5, line 57, the examiner respectfully disagrees with these arguments. The claim language of claim 29 does not require that there be plural straight surfaces on each of the two uppermost tangs on either side of the bisecting centerline; rather the claim language of claim 29 only requires a straight surface of each of the two uppermost tangs on either side of the bisecting centerline. Such a straight surface is shown at b1 in Heinig. With regard to Appellant's arguments that Heinig does not meet the claim language that requires three tangs - the two uppermost tangs being used to determine the lines that form the required angular relationship with the centerline, and that the bottommost tang does not lie along either of the determined lines, the examiner respectfully disagrees. Claim 29 does not require three tangs, it merely requires an uppermost tang on either side of the center line bisecting each of the buckets, and a bottommost tang. Such features are disclosed by Heinig as set forth in the body of the rejection above.

Concerning argument C, which is whether claims 10, 13-19 and 52-53 would have been obvious under 35 U.S.C. § 103(a) over Johnson 5,147,180 in view of Applicant's Prior Art, Appellant has argued that the examiner has erroneously applied Johnson for the same reasons argued above. The examiner respectfully disagrees for the same reasons set forth above, as pertain to the reference to Heinig. Appellant has also argued that neither Johnson nor

Applicant's Prior Art teach or suggest a wheelpost having a fillet with a radius of curvature of 0.0855 inches as required by claim 52. Appellant has specifically argued that Applicant's Prior Art has only been cited by the examiner as disclosing that as many as 92 buckets may be present in a turbine. The examiner agrees with this characterization of Applicant's Prior Art, but notes that Applicant's Prior Art is not relied upon to teach the specific wheelpost fillet radius of curvature.

Concerning Appellant's arguments that Johnson does not teach or suggest the angular relationship defined in part by the two uppermost tangs on either side of the bucket as required by independent claim 10, and that the examiner has erroneously used a single tang on Johnson to determine a single point through which any line can be drawn to form any angle with the center line of the bucket, and that in Johnson, a line defined by the two uppermost tangs of the bucket is shown in Figure 1 as line "TN" and is described in the specification, at column 4, lines 7-9, to be 15.75° not 25.78° as required by claim 10, the examiner respectfully disagrees with these arguments. Johnson still discloses the claimed subject matter. The straight surfaces of each of the two uppermost tangs on each side of a center line bisecting each of the buckets each respectively define a point of a line that forms an angle of 25.78 degrees with the center line on both of these references. The line drawn from the intersection of the straight surfaces of each of the two upper most tangs may be selectively drawn such that it intersects the center line (at a portion of the center line remote from the blade root) and forms the aforementioned 25.78 degree angle, such that this angle is the same as Appellant's angle E of 25.78 degrees in figure 10, and a point defined by intersecting tangent lines along pressure faces of the bottom most tang does not

lie on either line that forms the angle of 25.78 degrees with the center line, since the location where the drawn line that forms the angle E intersects the center line is an arbitrary location. Claim 10 does not limit the definition of the two points to the location at which the straight surfaces intersect, which is what the specification and figure 10 disclose. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See In re Van Geuns, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Concerning Appellant's arguments that with regard to claim 52, Johnson does not teach or suggest a wheelpost fillet having a radius of curvature of 0.0855 inches, as required by claim 52, nor an additional wheelpost fillet having a radius of curvature of 0.0752 inches, as required by claim 53, but that Johnson actually only discloses tangs on a bucket which the Examiner apparently assumes mirrors the fillets on a wheelpost which is not shown or described in Johnson, these arguments are respectfully disagreed with. It is readily clear to a person of ordinary skill in the art that the tangs of Johnson mirror the fillets on a wheelpost of Johnson, in order for the turbine blades 10 to be retained on the rotor, because the tangs of Johnson are mirror images of the fillets on the wheelpost of Johnson, in order to permit the intermeshing of the tangs and the fillets. As set forth in the rejection under 35 USC 103(a), Johnson discloses tangs and fillets with radii of curvature. The recitation that below the uppermost tang on each of the wheelposts the fillet has a radius of curvature of 0.0855 inches, and that above the bottom most tang on each of the wheelposts the fillet has a radius of curvature of 0.0752 inches are matters of choice in design. Johnson recognizes that these are result-effective variables which, when optimized, reduce the stresses in the blade roots and the grooves. It would have been further obvious at the time the invention was made to a person having ordinary skill in the art to

select the radius of curvature of the uppermost tang on each of the wheelposts of the fillet to have a specific radius of curvature, such as 0.0855 inches, and to select the radius of curvature above the bottom most tang on each of the wheelposts of the fillet to have a specific radius of curvature, such as of 0.0752 inches, for the purpose of reducing the stresses in the blade roots and the grooves, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch,* 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Concerning Appellant's argument that the tangs/fillets of Johnson have multiple radii of curvature and not a single radius of curvature as required by claims 52 and 53, this feature is not recited in claims 52 and 53. Appellant is attempting to import limitations from the specification which are not recited in the claims. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See In re Van Geuns, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Appellant has further argued that the citation of *In re Boesch* by the examiner is inapposite, because *In re Boesch* involved a chemical composition case in which there were overlapping ranges between the claimed constituents and those disclosed in the prior art, and in addition, the cited case involved an alleged unexpected result for the concentration of a single constituent material, and that neither of these factors are present here. These arguments are respectfully disagreed with, because the findings set forth in *In re Boesch* that discovering an optimum value of a result effective variable involves only routine skill in the art are clearly applicable to the claims of the instant application, and the prior art relied upon by the examiner (to Johnson, for example) clearly states that the particular blade root configuration achieves substantial gains in reducing local peak stress (Johnson, column 4, lines 22-27).

Concerning Appellant's citation of KSR International Co. v. Teleflex Inc., Appellant has argued that under KSR International Co. v. Teleflex Inc., Appellant's invention would not have been obvious, since there were virtually an infinite number of options for the specific number, angular relationships between, and dimensions of the tangs and fillets of the buckets and wheelposts, the specific relationships and dimensions arrived at in these claims, and not a finite number of identified, predictable solutions. The examiner respectfully disagrees. The rationale applied in rejecting the appropriate claims under 35 USC 103(a) are the findings set forth in In re Boesch, not KSR International Co. v. Teleflex Inc. KSR is not applied in this rejection. Thus, Appellant's argument lacks merit for this reason.

Concerning argument D, which is whether claim 12 would have been obvious under 35 U.S.C. § 103(a) over Johnson 5,147,180 and Applicant's Prior Art as applied to claim 10 above, and further in view of United Kingdom Patent 677,142, Appellant has argued that Johnson does not teach or suggest the 25.78° angle for the reasons set above. This argument is disagreed with for the reasons set forth above. Appellant has further argued that United Kingdom Patent 677,142 in figure 1 indicates that the required angular relationship would only be 15 degrees. It is pointed out that United Kingdom Patent 677,142 is relied upon to teach a turbine having a rotor with unnumbered buckets having tangs 3 which are formed at an angle of 55 degrees, and not the aforesaid 25.78° angle.

Concerning argument E1, which is whether claim 12 would have been obvious under 35 U.S.C. § 103(a) over Johnson 5,147,180 and Applicant's Prior Art as applied to claim 10 above, and further in view of Caruso 6,030,178, Appellant has argued that Caruso does not teach anywhere in its disclosure that it is providing scalloped wheelposts as required by claim 20, that Caruso is concerned with a system that provides for the final bucket to be radially inserted into the wheelpost thereby allowing interlocking covers 18 to mate with each other, that there is no mention anywhere in Caruso of providing scalloped wheelposts to reduce the weight of the wheel, as required by claim 20, and that the examiner has misinterpreted figure 1 of Caruso as showing scalloped tangs. Appellant has also argued that figure 1 of Caruso merely shows two protrusions, for example additional material, and not removed material, on the outer tang of wheel 10 and does not otherwise describe or even identify these protrusions with a reference

numeral anywhere in its specification. These arguments are disagreed with, because figure 1 of Caruso clearly shows a turbine wheel 10 having wheelposts shown generally at 12, which are formed such that an unnumbered outer tang edge of each wheelpost is scalloped, for the inherent purpose of reducing weight of the turbine wheel. Since the material at the outer tang edge of each wheelpost is not solid, but has the scalloped indentation, Caruso discloses scalloped tangs, as would be readily recognized by one of ordinary skill in the art.

Concerning argument E2, which is whether claim 12 would have been obvious under 35 U.S.C. § 103(a) over Heinig 5,176,500 and Applicant's Prior Art as applied to claim 10 above, and further in view of Caruso 6,030,178, Appellant has argued that Caruso does not teach anywhere in its disclosure that it is providing scalloped wheelposts as required by claim 20, that Caruso is concerned with a system that provides for the final bucket to be radially inserted into the wheelpost thereby allowing interlocking covers 18 to mate with each other, that there is no mention anywhere in Caruso of providing scalloped wheelposts to reduce the weight of the wheel, as required by claim 20, and that the examiner has misinterpreted figure 1 of Caruso as showing scalloped tangs. Appellant has also argued that figure 1 of Caruso merely shows two protrusions, for example additional material, and not removed material, on the outer tang of wheel 10 and does not otherwise describe or even identify these protrusions with a reference numeral anywhere in its specification. These arguments are disagreed with, because figure 1 of Caruso clearly shows a turbine wheel 10 having wheelposts shown generally at 12, which are formed such that an unnumbered outer tang edge of each wheelpost is scalloped, for the inherent purpose of reducing weight of the turbine wheel. Since the material at the outer tang edge of

each wheelpost is not solid, but has the scalloped indentation, Caruso discloses scalloped tangs, as would be readily recognized by one of ordinary skill in the art.

Concerning argument F, which is whether claims 10, 16-17, and 19, 44-45, 55-56, and 59-60 would have been obvious under 35 U.S.C. § 103(a) over Heinig 5,176,500 in view of Applicant's Prior Art, Appellant has argued that in applying Heinig against independent claim 10, the examiner has committed the same error described above with respect to its application against independent claim 29 and in rejecting claim 10 under 35 U.S.C. 112, second paragraph, as discussed above. Appellant has specifically argued that the examiner has erroneously used a single upper tang (one on each side of the bucket) to determine a single point used to define a line forming an angle of 25.78° with the center line of the bucket and that if the two uppermost tangs on each side of the bucket disclosed in Heinig are used, as required by claim 10, to define the line then the angle formed between that line and the center line is approximately 15° not the required 25.78°. Appellant has further argued that claim 10 further requires that a point defined by intersecting tangent lines along the pressure faces of the bottommost tang does not lie along the line that forms the angle of 25.78° with the center line and that since Heinig only has two tangs, the bottommost tang must be used to define the line forming an angle of 25.78° with the center line of the bucket, and it necessarily must lie along the line it was used to define contrary to the required claim language.

These arguments are respectfully disagreed with, because Heinig still discloses the claimed subject matter. The straight surfaces of each of the two uppermost tangs on each side of a center line bisecting each of the buckets each respectively define a point of a line that forms an angle of 25.78 degrees with the center line on both of these references. The line drawn from the

intersection of the straight surfaces of each of the two upper most tangs may be selectively drawn such that it intersects the center line (at a portion of the center line remote from the blade root) and forms the aforementioned 25.78 degree angle, such that this angle is the same as Appellant's angle E of 25.78 degrees in figure 10, and a point defined by intersecting tangent lines along pressure faces of the bottom most tang does not lie on either line that forms the angle of 25.78 degrees with the center line, since the location where the drawn line that forms the angle E intersects the center line is an arbitrary location. Claim 10 does not limit the definition of the two points to the location at which the straight surfaces intersect, which is what the specification and figure 10 disclose. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See In re Van Geuns, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

With regard to Appellant's arguments that Heinig does not disclose a bucket having tangs formed from multiple straight surfaces, as required by claim 10, and that Heinig discloses that each of its two tangs are formed from curved surfaces having radii of R1 through R8 and a single flat bearing surface b1 (for the uppermost tang) and b2 (for the bottommost tang) as shown in figure 1 and described at column 4, line 42 through column 5, line 57, the examiner respectfully disagrees with these arguments. The claim language of claim 10 does not require that there be plural straight surfaces on each of the two uppermost tangs on either side of the bisecting centerline; rather the claim language of claim 10 only requires a straight surface of each of the two uppermost tangs on either side of the bisecting centerline. Such a straight surface is shown at b1 in Heinig.

With regard to Appellant's arguments that Heinig does not meet the claim language that requires three tangs - the two uppermost tangs being used to determine the lines that form the required angular relationship with the centerline, and that the bottommost tang does not lie along either of the determined lines, the examiner respectfully disagrees. Claim 10 does not require three tangs, it merely requires an uppermost tang on either side of the center line bisecting each of the buckets, and a bottommost tang. Such features are disclosed by Heinig as set forth in the body of the rejection above.

Appellant has further argued that the citation of *In re Boesch* by the examiner is inapposite, because *In re Boesch* involved a chemical composition case in which there were overlapping ranges between the claimed constituents and those disclosed in the prior art, and in addition, the cited case involved an alleged unexpected result for the concentration of a single constituent material, and that neither of these factors are present here. These arguments are respectfully disagreed with, because the findings set forth in *In re Boesch* that discovering an optimum value of a result effective variable involves only routine skill in the art are clearly applicable to the claims of the instant application, and the prior art relied upon by the examiner (to Heinig, for example) clearly states that the particular blade root configuration provides significantly lower steeple or lug stresses under all fit conditions (column 2, lines 52-57).

Concerning Appellant's citation of KSR International Co. v. Teleflex Inc., Appellant has argued that under KSR International Co. v. Teleflex Inc., Appellant's invention would not have been obvious, since there were virtually an infinite number of options for the specific number,

angular relationships between, and dimensions of the tangs and fillets of the buckets and wheelposts, the specific relationships and dimensions arrived at in these claims, and not a finite number of identified, predictable solutions. The examiner respectfully disagrees. The rationale applied in rejecting the appropriate claims under 35 USC 103(a) are the findings set forth in In re Boesch, not KSR International Co. v. Teleflex Inc. KSR is not applied in this rejection. Thus, Appellant's argument lacks merit for this reason.

Concerning argument G, which is whether claims 29-33 would have been obvious under 35 U.S.C. 103(a) over Johnson 5,147,180, Appellant has argued that examiner has erroneously used a single upper tang (one on each side of the bucket) to determine a single point used to define a line forming an angle of 25.78° with the center line of the bucket, and that Johnson does not teach or suggest the angular relationship defined in part by the two uppermost tangs on either side of the bucket as required by independent claim 29, and that the examiner has erroneously used a single tang on Johnson to determine a single point through which any line can be drawn to form any angle with the center line of the bucket, and that in Johnson, a line defined by the two uppermost tangs of the bucket is shown in Figure 1 as line "TN" and is described in the specification, at column 4, lines 7-9, to be 15.75° not 25.78° as required by claim 29. The examiner respectfully disagrees with these arguments. Johnson still discloses the claimed subject matter. The straight surfaces of each of the two uppermost tangs on each side of a center line bisecting each of the buckets each respectively define a point of a line that forms an angle of 25.78 degrees with the center line on both of these references. The line drawn from the intersection of the straight surfaces of each of the two upper most tangs may be selectively drawn

such that it intersects the center line (at a portion of the center line remote from the blade root) and forms the aforementioned 25.78 degree angle, such that this angle is the same as Appellant's angle E of 25.78 degrees in figure 10, and a point defined by intersecting tangent lines along pressure faces of the bottom most tang does not lie on either line that forms the angle of 25.78 degrees with the center line, since the location where the drawn line that forms the angle E intersects the center line is an arbitrary location. Claim 29 does not limit the definition of the two points to the location at which the straight surfaces intersect, which is what the specification and figure 10 disclose. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See In re Van Geuns, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Appellant has further argued that the citation of *In re Boesch* by the examiner is inapposite, because *In re Boesch* involved a chemical composition case in which there were overlapping ranges between the claimed constituents and those disclosed in the prior art, and in addition, the cited case involved an alleged unexpected result for the concentration of a single constituent material, and that neither of these factors are present here. These arguments are respectfully disagreed with, because the findings set forth in *In re Boesch* that discovering an optimum value of a result effective variable involves only routine skill in the art are clearly applicable to the claims of the instant application, and the prior art relied upon by the examiner (to Johnson, for example) clearly states that the particular blade root configuration achieves substantial gains in reducing local peak stress (Johnson, column 4, lines 22-27).

Concerning Appellant's citation of KSR International Co. v. Teleflex Inc., Appellant has argued that under KSR International Co. v. Teleflex Inc., Appellant's invention would not have been obvious, since there were virtually an infinite number of options for the specific number, angular relationships between, and dimensions of the tangs and fillets of the buckets and wheelposts, the specific relationships and dimensions arrived at in these claims, and not a finite number of identified, predictable solutions. The examiner respectfully disagrees. The rationale applied in rejecting the appropriate claims under 35 USC 103(a) are the findings set forth in In re Boesch, not KSR International Co. v. Teleflex Inc. KSR is not applied in this rejection. Thus, Appellant's argument lacks merit for this reason.

Concerning argument H, which is whether claims 34-40 would have been obvious under 35 U.S.C. § 103(a) over Johnson 5,147,180 in view of Leonardi, Appellant has presented the same arguments with regard to Johnson as set forth above. The examiner respectfully disagrees with these arguments for the reasons previously set forth above.

Concerning argument I, which is whether claims 41-43 would have been obvious under 35 U.S.C. 103(a) over Pisz 4,824,328 in view of Applicant's Prior Art, Appellant has argued that the examiner improperly asserts that the specific dimensions given for the fillets and tangs in claims 41-43 are mere matters of choice in design and cites *In re Boesch* for support. Appellant has further argued that the citation of *In re Boesch* by the examiner is inapposite, because *In re Boesch* involved a chemical composition case in which there were overlapping ranges between the claimed constituents and those disclosed in the prior art, and in addition, the cited case involved an alleged unexpected result for the concentration of a single constituent material, and

that neither of these factors are present here. Appellant has further argued that under KSR International Co. v. Teleflex Inc., Appellant's invention would not have been obvious, since there were virtually an infinite number of options for the specific number, angular relationships between, and dimensions of the tangs and fillets of the buckets and wheelposts, the specific relationships and dimensions arrived at in these claims, and not a finite number of identified, predictable solutions. The examiner respectfully disagrees with these arguments for the same reasons set forth previously above.

Concerning argument J, which is whether claims 48-49 would have been obvious under 35 U.S.C. 103(a) over Heinig 5,176,500 and Applicant's Prior Art and further in view of Phipps 6,893,226, Appellant has argued that Phipps is only being cited for disclosing 55° for the angle between the upper most straight portion of the upper most fillet and the upper most straight portion of the upper most tang instead of the required angle of 50° in claims 48 and 49, that Phipps does not even disclose the examiner's alleged angle of 55° anywhere in its specification, and that there is not any figure in Phipps from which an accurate measurement of the angle could be obtained, stating that figures 1 and 2 of Phipps are perspective drawings and figure 3 of Phipps is a partial drawing that does not even show the upper fillet and tang from which the required angle could be measured.

These arguments are respectfully disagreed with, because figure 3 of Phipps shows that the turbine blade 30 has an angle between an upper most straight portion of an upper most fillet 52 and an upper most straight portion of an upper most tang being 55 degrees, for the purpose of allowing the blade to withstand centrifugal loading when in operation. Phipps establishes that

the angle is 55 degrees (which is close to Appellant's claimed angle of 50 degrees), while the rejection states that "The specific recitation of this angle being 50 degrees is a matter of choice in design. This angle is known to be a result-effective variable which adjusts the stress distribution in the blade roots. It would have been further obvious at the time the invention was made to a person having ordinary skill in the art to form the modified turbine of Heinig such that this specific angle is 50 degrees, for the purpose of optimizing the stress distribution in the blade roots, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980)."

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

This examiner's answer contains a new ground of rejection set forth in section **(9)** above. Accordingly, appellant must within **TWO MONTHS** from the date of this answer exercise one of the following two options to avoid *sua sponte* **dismissal of the appeal** as to the claims subject to the new ground of rejection:

(1) **Reopen prosecution.** Request that prosecution be reopened before the primary examiner by filing a reply under 37 CFR 1.111 with or without amendment, affidavit or other evidence. Any amendment, affidavit or other evidence must be relevant to the new grounds of

rejection. A request that complies with 37 CFR 41.39(b)(1) will be entered and considered. Any request that prosecution be reopened will be treated as a request to withdraw the appeal.

(2) **Maintain appeal.** Request that the appeal be maintained by filing a reply brief as set forth in 37 CFR 41.41. Such a reply brief must address each new ground of rejection as set forth in 37 CFR 41.37(c)(1)(vii) and should be in compliance with the other requirements of 37 CFR 41.37(c). If a reply brief filed pursuant to 37 CFR 41.39(b)(2) is accompanied by any amendment, affidavit or other evidence, it shall be treated as a request that prosecution be reopened before the primary examiner under 37 CFR 41.39(b)(1).

Extensions of time under 37 CFR 1.136(a) are not applicable to the TWO MONTH time period set forth above. See 37 CFR 1.136(b) for extensions of time to reply for patent applications and 37 CFR 1.550(c) for extensions of time to reply for ex parte reexamination proceedings.

Respectfully submitted,

/Christopher Verdier/

Primary Examiner, Art Unit 3745

A Technology Center Director or designee must personally approve the new ground(s) of rejection set forth in section (9) above by signing below:

/KAREN M. YOUNG/

Director, Technology Center 3700

Conferees:

/Edward K. Look/
Supervisory Patent Examiner, Art Unit 3745

/Kenneth B Rinehart/

Supervisory Patent Examiner, Art Unit 3743